REMARKS

Review and reconsideration of the Office Action of February 27, 2004 is respectfully requested in view of the above amendments and the following remarks.

In order to better distinguish over the state of the art, Claims 12 and 15 have been incorporated into claim 1, and dependencies of claims amended accordingly.

Present Invention

In the art of tracking of vehicle lane markers, it is known to record an image corresponding to the scene ahead of a vehicle. To reduce data processing complexity and false target identification, it is known to search for and identify lane markers, within the total image area being searched, in only those areas where lane markers are expected to be found with high probability - regions of interest (ROI).

The present invention is concerned with an improved process for identification of possible lane markers within this ROI.

For example, the prior art teaches **template matching**, wherein data relating to a possible lane marker is compared against a template. However, for every identified possible lane marker, there would be a need for a library of "views" (all possible different perspectives, geometries, shapes, configurations, etc) against which every detected shape must be compared. This not only requires high computing power, it is slow and liable to mistakes.

The present invention, as now claimed in claim 1, represents an improvement in using a **matched filter** in order to better extract from the background the image points associated with a vehicle lane marker. This technique is illustrated in Fig. 4.

Office Action

Turning now to the Office Action in greater detail, the paragraphing of the Examiner is adopted.

Claim Rejection 35 U.S.C. §112 (formalities)

At pages 2-4 of the Office Action, Claims 1-24 are rejected under 35 USC §112, second paragraph.

In response, Applicants have carefully reviewed the rejections and have extensively revised the claims where appropriate. However, not every objected to term has been amended. Express antecedent definition has not been provided for those terms which are clearly inherent and which do not render the claim indefinite. As set forth in MPEP 2173.05(c):

> Obviously, however, the failure to provide explicit antecedent basis for terms does not always render a claim indefinite. ... Inherent components of elements recited have antecedent basis in the recitation of the components themselves. **For example, the limitation "the outer surface of said sphere" would not require an antecedent recitation that the sphere has an outer surface.**

Thus, for example, since every vehicle will inherently have a position and a yaw angle, the terms "the position" and "the yaw angle" with regard to the vehicle require no antecedent recitation. Further, every cluster of points will have a center

of gravity.

Applicants also amend the process claims to recite positive process steps, and begin the claims with the term "A".

Drawings

The drawings are objected to because Figs. 2 and 3 fail to show drawing descriptions. A proposed drawing correction or corrected drawings are required.

In response, Applicants submit herewith replacement drawings with text inserted into the figures.

Claim Rejection 35 U.S.C. §102 (anticipation)

Claims 1-24 are rejected under 35 U.S.C. §102(e) as being anticipated by Kenue (US 4,970,653).

Kenue was cited by Applicants to the Examiner in the IDS filed November 1, 2000, and is discussed at page 1 of the present specification.

In response, Applicants amend claim 1 by incorporating the limitations from claims 12 and 15 therein. The invention improves over the inefficient and complex **template matching** by using a **matched filter** in order to better extract from the background the image points associated with a vehicle lane marker.

The invention as presently claimed can be understood by reference to Fig. 4 which shows an example of a gray-scale or tonal value processing of image data, wherein the regions evaluated by the matched-filter are extracted.

The matched filter can be applied to the x- and y-components of the image data (see claims 14 and 16), and differs from template matching in that the data are not compared with a template, but rather the *a priori* knowledge regarding the configuration or geometry of the vehicle lane marker being searched for in the image data

With reference to Fig. 4, in particularly advantageous manner the matched filter is so arranged that in the framework of its application in the environment of the position being examined, the average gray scale or tone value (hereafter gray value) of the background is measured, and that on the presentation of an image point, which is potentially to be associated with a vehicle lane marking, is confined on the basis of a comparison between background noise, the average gray value in the environment, and the gray value of the position to be searched. In general, for this the filter is implemented in separated geometry or model-type, in which the x-y components are presented separately. It has however been found, that for location or determination of point-shaped vehicle lane markings in the most cases, the processing complexity can be reduced, when in the evaluation of the matched filter only the x-components are considered. For this, the average value and the standard deviation right and left of a position to be examined are measured. If the gray value exceeds the average value of the intensity of the background at more than the comparative threshold determined from the white noise of the background and threshold determination, the position is marked as potentially belonging to a vehicle lane marking.

Accordingly, Kenue may disclose template matching and may disclose Kalman filter, but contrary to the Examiner's position with regard to original claims 12-15, Kenue does not disclose a matched filter.

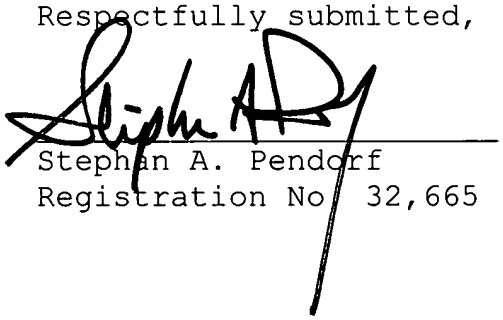
Accordingly, withdrawal of the rejection is respectfully requested.

Other prior art

Applicants have reviewed Iisaka et al, Shima et al, Hasegawa et al and Unoura, and submit that these references do not teach the present invention.

Accordingly, early issuance of the Notice of Allowance is respectfully requested.

Respectfully submitted,



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